MONTANA FISH, WILDLIFE AND PARKS
FISHERIES DIVISION

ENVIRONMENTAL ASSESSMENT
COTTONWOOD CREEK REHABILITATION AND NATIVE SALMONID REINTRODUCTION

PART I. PROPOSED ACTION DESCRIPTION

A. **Type of Proposed Action:** Cottonwood Creek, a stream which flows through Montana Fish, Wildlife and Parks (MFWP) owned Beartooth Game Range, Sieben Livestock Company and the Voegle ranch, is approximately 14.5 miles long from headwaters to mouth where it flows into Holter Reservoir. Actual stream length on Sieben Livestock is 1.76 miles of which 0.3 miles were wetted during an August 2000 survey. An artificial barrier to upstream fish passage was constructed on Cottonwood Creek in the fall of 2000, isolating 10.5 miles of stream habitat. Six of the 10.5 miles above the barrier were wetted during August 2000, with a small percentage of this actually flowing. Conditions in 2001 were similar to those measured in 2000 however, conditions improved in 2002 with heavy spring snowfall that recharged the water table and provided Cottonwood creek with perennial flows throughout 2002. Because of the change from drought conditions (intermittent) to perennial flow, the 2002 chemical rehabilitation project was postponed. **This proposal remains the same as that approved in 2002 with the exception that potassium permanganate ($KMnO_4$) will be applied at approximately equal concentrations to rotenone to detoxify the rotenone below the fish barrier**. This will eliminate the risk of rotenone impacting the lower reaches of Cottonwood Creek and the confluence area on Holter Reservoir. The proposed action is to chemically rehabilitate Cottonwood Creek in the 10.5 miles of stream above the barrier using rotenone applied as per manufacturers guidelines and detoxify the rotenone below the fish barrier using potassium permanganate ($KMnO_4$) in approximately equal concentrations to the rotenone. Following chemical rehabilitation, we propose to restock the rehabilitated reach in 2004-2005 with native westslope cutthroat trout from an existing pure population in the Missouri River drainage.

B. **Agency Authority for the Proposed Action:** The Montana Fish, Wildlife & Parks (FWP) "...is hereby authorized to perform such acts as may be necessary to the establishment and conduct of fish restoration and management projects...." under statute 87-1-702.

C. **Estimated Commencement Date:** July/August, 2003
Estimated Completion Date: September, 2003
Current Status of Project Design: (% Complete): 30%

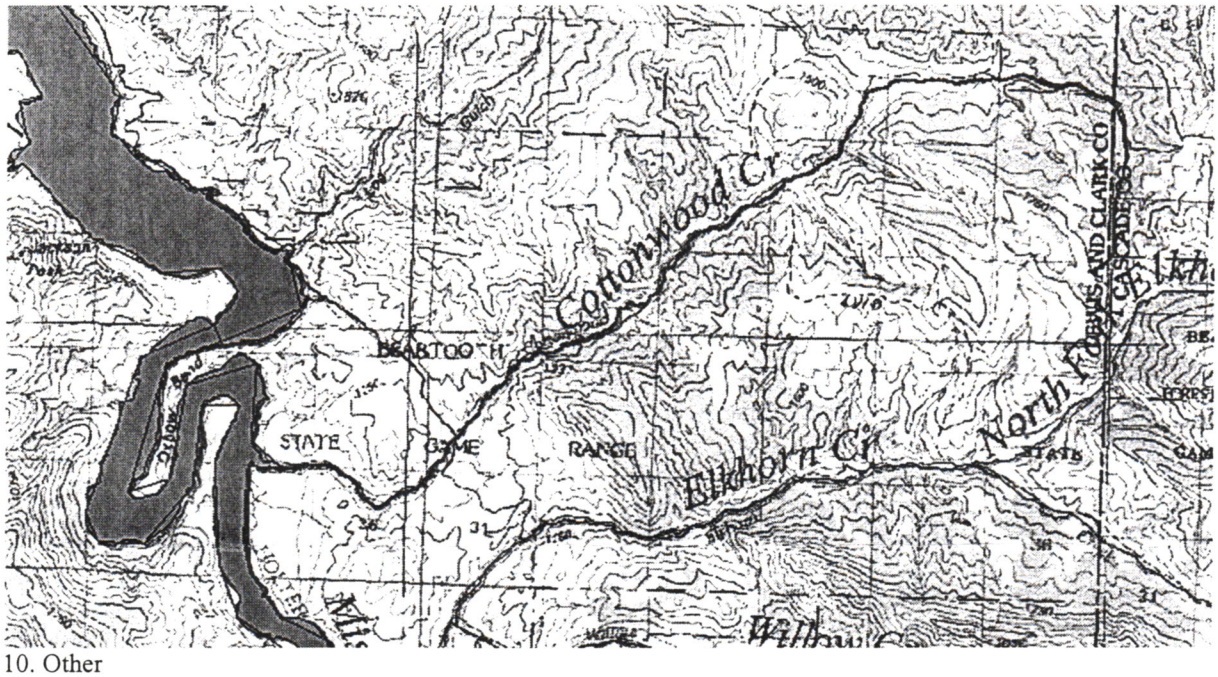
D. Name and Location of the Project: *Cottonwood Creek Rehabilitation Project*: *Beartooth Game Range, Sieben Livestock Company Ranch and Voegle Livestock..*

Cottonwood Creek is a small tributary to Holter Reservoir that originates in Cascade County (Section 24 , T14N, R2W). Roughly 88% of the stream length is on MFWP's Beartooth Game Range with the remaining 12% on property owned by Sieben Livestock Company Ranch and Voegle Livestock.

E. Project Size (acres affected)

1. Developed/residential - 0 acres
2. Industrial - 0 acres
3. Open Space/Woodlands/Recreation - 0 acres
4. Wetlands/Riparian – 10.5 miles of stream
5. Floodplain - 0 acres
6. Irrigated Cropland - 0 acres
7. Dry Cropland - 0 acres
8. Forestry - 0 acres
9. Rangeland - 0 acres

Cascade Misc. 12



10. Other

Figure 1. Cottonwood Creek, Montana and vicinity.

F. Narrative Summary of the Proposed Action and Purpose of the Proposed Action

1. **Summary of the Proposed Action:**

The proposed action is to chemically rehabilitate Cottonwood Creek using two treatments of the piscicide rotenone accompanied by detoxification with $KMnO_4$. The goal of the treatment would be to eradicate nonative brook and rainbow trout above the newly installed fish barrier. Then, over the next several years, the stream would be restocked with genetically pure, native westslope cutthroat trout from an existing population in the Missouri River that has been shown to be at high risk of extinction. Some of the application techniques used to apply rotenone will include; drip stations, powered rotenone "doughballs", and manual backpack spraying. Application of $KMnO_4$ will be conducted using drip stations and in limited cases, manual spraying. Multiple application methods are required to effectively treat a variety of habitat types that exist in Cottonwood Creek. Fishing pressure on this small stream is very low however; angling could be disrupted for 2-5 years, depending on the source, number, and size of westslope cutthroat trout that are used to restock the stream. Angler catch rates in the post-rehabilitation, westslope cutthroat stream has the potential to increase as westslope cutthroat trout tend to be easier to catch than brook trout.

Cottonwood Creek has no record of being stocked by MFWP and the current fish assemblage in the stream originated from unknown sources. MFWP chemically rehabilitated neighboring Elkhorn Creek (See Figure 1) in 1972 after constructing an upstream fish barrier. This barrier and nonnative removal project has proven to be one of the earliest westslope conservation activities in Montana. Genetic surveys of fish in Elkhorn Creek have determined that introgression from rainbow trout has occurred in recent years. At this point it is unknown if rainbow trout jumped the barrier, anglers sabotaged the cutthroat population by physically moving rainbow above the barrier, or if the initial chemical treatment did not remove all non-native trout above the barrier. This issue will be addressed in future years.

2. Purpose and Need for the Proposed Action:

Westslope cutthroat trout were the native trout in the Missouri River drainage. Populations have undergone severe declines throughout its historic range. A recent assessment indicates most of the remaining populations have relatively high risk of becoming extinct (Shepard et al. 1997). Current information shows that pure westslope cutthroat trout are present in approximately 200 miles (4.8%) of the original 4200 miles of streams in North Central Montana. The 4200 miles of habitat in North Central Montana in FWP's Region 4, represents approximately 50% of the original range of westslope cutthroat east of the Continental Divide in the Upper Missouri River drainage. We consider pure westslope cutthroat trout populations to be secure in only 2-3% of the original, historic range in North Central Montana. A secure population is one where there is a long-term viable population of 2500 or more fish. For example, in adjacent Smith River drainage, current survey and inventory work has documented only about 10.3 stream miles of known 100% pure westslope populations. This does not include at least one population in the Little Belt Mountains that is isolated and was genetically pure when tested in 1985. However, it does show how little habitat is now occupied by westslope cutthroat in the drainage today. Hybridization with rainbow trout and other strains of cutthroat, competition with brook trout, exploitation, and habitat degradation have been responsible for this reduction over their historic range.

To ensure the continued survival of the state fish of Montana, projects to expand its current range in the Upper Missouri drainage are necessary. This proposed action will strive towards achieving that goal; it will establish a fluvial population on state owned land that should have a high likelihood of remaining secure for generations. Eventually, the Department intent is to restore enough healthy, genetically pure populations so that the species will become secure and not go extinct.

3. Benefits of the Project:

This project is projected to increase the habitat occupied by genetically pure westslope cutthroat trout. If successful, this project would create a westslope cutthroat trout population and lower the risk of extinction of this species in the Upper Missouri Drainage. Additionally, this project would also help achieve the goal and objectives listed in the Conservation Agreement for the restoration of westslope cutthroat trout both statewide and in the Upper Missouri River drainage. Threats that warrant consideration of westslope cutthroat trout as an Endangered Species should be significantly reduced or eliminated through implementation of these and similar restoration efforts. Social benefits of efforts like this include the opportunity for future generations of Montanans to use and enjoy this unique native fish species.

G. Other Local, State, or Federal agencies with overlapping jurisdiction

Department of Environmental Quality - Helena

H. Agencies Consulted During the Preparation of the EA

Montana Fish, Wildlife & Parks – Helena, Great Falls
Department of Environmental Quality - Helena

PART II. ENVIRONMENTAL REVIEW

A. PHYSICAL ENVIRONMENT

1. LAND RESOURCES Will the proposed action result in:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Soil instability or changes in geologic		X				

substructure?						
b. Disruption, displacement, erosion, compaction, moisture loss, or over-covering of soil which would reduce productivity or fertility?		X				
c. Destruction, covering or modification of any unique geologic or physical features?		X				
d. Changes in siltation, deposition or erosion patterns that may modify the channel of a river or stream or the bed or shore of a lake?		X				
e. Exposure of people or property to earthquakes, landslides, ground failure, or other natural hazard?		X				

2. WATER Will the proposed action result in:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Discharge into surface water or any alteration of surface water quality including but not limited to temperature, dissolved oxygen or turbidity?			X		NO	2a
b. Changes in drainage patterns or the rate and amount of surface runoff?		X				
c. Alteration of the course or magnitude of floodwater or other flows?		X				
d. Changes in the amount of surface water in any water body or creation of a new water body?		X				
e. Exposure of people or property to water related hazards such as flooding?		X				
f. Changes in the quality of groundwater?		X				2f
g. Changes in the quantity of groundwater?		X				
h. Increase in risk of contamination of surface or groundwater?			X		YES	See 2a and 2f
i. Effects on any existing water right or reservation?		X				
j. Effects on other water users as a result of any alteration in surface or groundwater quality?			X		YES	2j
k. Effects on other users as a result of any alteration in surface or groundwater quantity?		X				
l. Will the project affect a designated floodplain?		X				
m. Will the project result in any discharge that will affect federal or state water quality regulations? (Also see 2a)			X		NO	see 2a

Comment 2a: Rotenone will be introduced into Cottonwood Creek water above the upstream fish barrier. This will occur with two treatments. The concentration of rotenone (2ppm of a 5% rotenone formulation, or 0.1 ppm rotenone) which will be used in this project will not be harmful to plants, most invertebrate populations, adult amphibians, reptiles, birds, or mammals, including humans, from exposure to treated water, drinking of treated water, or ingestion of treated fish.

Rotenone is a naturally occurring substance derived from the roots of several tropical and sub-tropical plants in the bean family, Leguminosae, including jewel vine or Flame tree (*Derris* spp.) and lacepod (*Lonchocarpus* spp.) and hoary pea (*Tephrosia* spp.)(Finlayson et al. 2000). We plan on using a powder form which is obtained from ground-up plant roots and a liquid formulation that was extracted from the roots. The effect of both powder and liquid is to inhibit a biochemical process at the cellular level which makes it impossible for the fish to use oxygen absorbed in the blood and needed in the release of energy during respiration (Oberg 1967a, 1967b).

Rotenone has only a minor potential impact on the water quality for several reasons. The hazard associated with drinking water containing rotenone is very small because of the low concentration of rotenone (0.1 ppm) used in the treatment and the rapid breakdown and dilution of rotenone. The time for natural degradation (neutralization) of rotenone is controlled primarily by temperature. Rotenone acts and degrades faster in warmer water (Horton 1991). In California, studies have shown that rotenone completely degrades within 1-8 weeks within the

temperature range of 50-68F (10-20C) (CDFG 1994; Siepmann and Finlayson 1999). The estimated half-life of rotenone in California waters was 7.8-15 days at the aforementioned temperatures (Finlayson et al. 2000). Other studies have shown half-life values of 13.9 hours to 10.3 days for water temperatures of 75F and 41F (24C and 5C), respectively (Gilderhus et al. 1986, 1988). Marking and Bills (1976) found that toxicity decreased more rapidly at 63F (17C) than at 54F (12C) (the half-lives were 13 and 22 days, respectively). The rotenone dissipates in flowing water quickly as a result of dilution, hydrolysis, and photolysis (Borriston Laboratories 1983; Cheng et al. 1972; Biosherics 1982; Finlayson et al. 2000). Rotenone will be quickly broken down with the application of $KMnO_4$ at approximately equal concentrations to rotenone.

To reduce the potential risks associated with the use of rotenone, the following mitigation measures and monitoring efforts will be employed:

1. Detoxification stations will be set up below the barrier. Potassium permanganate $KMnO_4$ will be used to neutralize the fish toxicant.
2. Sentinel (fish in cages) will be located below the detoxification station and within the target reach to determine and monitor the effectiveness of both the rotenone and $KMnO_4$.
3. Project personnel will be trained in the use of these chemicals including the actions necessary to deal with spills; personnel will wear rubber gloves and safety goggles.
4. Only the amount of rotenone that is needed for immediate use will be held near the stream.
5. Prior to the use of rotenone, Sieben and Voegle Livestock will be notified.
6. Signs will be placed at the trailhead into Cottonwood Creek and periodically along the treated reach to notify the public of the project in progress.

Comment 2f: Changes in groundwater quality: The risk that rotenone will enter and be mobile in groundwater is minimal. Rotenone's ability to move through soil is low to slight (Finlayson et al. 2000). Rotenone moves less than 1 inch in most types of soils, except for sandy soils where the movement is slightly more than 3 inches. Rotenone is strongly bound to organic matter in soil, so it is unlikely that rotenone would enter the groundwater (Dawson et al. 1991). Rotenone can be found in lake sediments at similar concentrations as in water; its breakdown lags behind that of water by 1-2 weeks (Finlayson et al. 2000). Rotenone in stream sediments is uncommon (CDFG 1994). However, even if groundwater contamination could occur, there would be a low potential for detrimental effects on human health, since the surface water concentrations to be used in this project have already been shown to have no toxic effect on humans or other animals. Furthermore, any rotenone that enters groundwater will continue to be diluted by water already present in the aquifer. Finally, the chance for exposure to rotenone is minimal since no domestic wells are nearby.

Comment 2j: Effects on other water users: Bioassays on mammals suggest that at the proposed concentrations of rotenone that will be used, it would have no effect on mammals that drink the treated water. There is no reason to restrict the use of rotenone in waters intended for irrigation, livestock consumption (except possibly for swine), and recreational swimming use (USEPA 1981b). Although the studies required for setting tolerances have been completed, the USEPA has not established tolerances for rotenone in potable and irrigation water. As a result, although waters with rotenone present may not cause problems, water containing residues of rotenone can not be legally allowed for use for domestic or crop use. The degradation process can vary from 1-8 weeks depending on initial concentrations, temperature, and water chemistry. This is not a concern on Cottonwood Creek as it is not used for domestic purposes except in the short reach on Sieben Livestock property where livestock can be pastured elsewhere. The public will be notified of the project through signs placed along Cottonwood Creek and at the trailhead.

3. AIR Will the proposed action result in:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Emission of air pollutants or deterioration of ambient air quality? (also see 13 (c))		X				
b. Creation of objectionable odors?		X				
c. Alteration of air movement, moisture, or temperature patterns or any change in climate, either locally or regionally?		X				
d. Adverse effects on vegetation, including crops, due to increased emissions of pollutants?		X				
e. Will the project result in any discharge, which will conflict with federal or state air quality regs?		X				
4. VEGETATION **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Changes in the diversity, productivity or abundance of plant species (including trees, shrubs, grass, crops, and aquatic plants)?		X				
b. Alteration of a plant community?		X				
c. Adverse effects on any unique, rare, threatened, or endangered species?		X				
d. Reduction in acreage or productivity of any agricultural land?		X				
e. Establishment or spread of noxious weeds?		X				
f. Will the project affect wetlands, or prime and unique farmland?		X				

5. FISH/WILDLIFE Will the proposed action result in:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Deterioration of critical fish or wildlife habitat?		X				
b. Changes in the diversity or abundance of game animals or bird species?			X		NO	5b
c. Changes in the diversity or abundance of non-game species?			X		YES	5c
d. Introduction of new species into an area?		X				
e. Creation of a barrier to the migration or movement of animals?		X				
f. Adverse effects on any unique, rare, threatened, or endangered species?		X				
g. Increase in conditions that stress wildlife populations or limit abundance (including harassment, legal or illegal harvest or other human activity)?		X				
h. Will the project be performed in any area in which T&E species are present, and will the project affect any T&E species or their habitat? (Also see 5f)		X				
i. Will the project introduce or export any species not presently or historically occurring in the receiving location? (Also see 5d)		X				

Comment 5b: This proposed action is intended to result in an increase of native westslope cutthroat trout and a decrease in non-native rainbow and brook trout in Cottonwood Creek. After this project is completed, rainbow trout and brook trout will continue to be dominant species in Cottonwood Creek below the barrier to the mouth of Holter Reservoir. The project's goal is to increase the abundance and security of the westslope cutthroat trout in the drainage, a unique and potentially endangered resource with limited distribution throughout the upper Missouri River drainage.

Comment 5c: Rotenone has a minimal impact on non-target species. This chemical has some toxicity to all oxygen-breathing animals, but at the concentrations we will use, it is selective to fish and gill-breathing organisms. Most common aquatic invertebrates are less sensitive to rotenone than fish. The predicted effect is a temporary decrease in some invertebrate populations (Bramblett 1998; MFWP 1999). Some zooplankton, such as cladocerans and copepods are just as sensitive as fish but have life history stages that will survive the treatment. Snails and clams are tolerant. All animals, including fish, insects, birds, and mammals have natural enzymes in the digestive tract that neutralize rotenone, and the gastrointestinal absorption is inefficient. Fish, some amphibians, and aquatic invertebrates are more susceptible because rotenone is absorbed directly into their blood through their gills, bypassing the digestive enzymes that would neutralize it. Rotenone residues in dead fish are generally very low, <0.1 ppm, unstable like those in water, and not readily absorbed through the gut of the animal eating the fish. Birds and mammals that eat the dead fish and drink treated water should not be affected. A bird weighing 0.25 pounds would have to consume 100 quarts of water or more than 40 pounds of fish within 24 hours to receive a lethal dose. The 0.25 pound bird normally consumes 0.2 ounces of water and 0.32 ounces of food daily; a safety factor of 1,000-10,000 fold exists for birds and mammals (Finlayson et al. 2000). No latent or continuing toxicity is expected for more than a few weeks (CDFG 1994). Livestock are subjected to low risks as a result of this proposal. Rotenone was used for many years to control grubs on the backs of dairy and beef cattle. The USEPA (1981b) has stated that there is no need to restrict livestock consumption of treated waters. However, swine are more sensitive than cattle (Thompson 1985). Most dead fish will sink to the bottom of the treated water

in several days, decompose, and release nutrients back into the water. The nutrients will enhance phytoplankton and insect and zooplankton production, which provide the food base for fish planted in the future. As a result of this action, fish eating birds and mammals may have an increase in food abundance for several days after the treatment. However, following this abundance, a temporary reduction in food supplies for fish and invertebrate-eating birds and mammals will result until the fish and invertebrate populations in the waterbody are restored. Most of these animals will simply utilize other waters and sources of food.

Mottled sculpin are the only non-target fish species that are known to be present in Cottonwood Creek that will potentially be affected by the proposed treatment. Mottled sculpin will be reintroduced following treatment. Also, some taxa of invertebrates and crustaceans are predicted to undergo a temporary decrease in population levels.

B.HUMAN ENVIRONMENT

6. NOISE/ELECTRICAL EFFECTS **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Increases in existing noise levels?		X				
b. Exposure of people to severe or nuisance noise levels?		X				
c. Creation of electrostatic or electromagnetic effects that could be detrimental to human health or property?		X				
d. Interference with radio or television reception and operation?		X				

7. LAND USE **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Alteration of or interference with the productivity or profitability of the existing land use of an area?		X				
b. Conflicted with a designated natural area or area of unusual scientific or educational importance?		X				
c. Conflict with any existing land use whose presence would constrain or potentially prohibit the proposed action?		X				
d. Adverse effects on or relocation of residences?		X				

8. RISK/HEALTH HAZARDS Will the proposed action result in:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Risk of an explosion or release of hazardous substances (including, but not limited to oil, pesticides, chemicals, or radiation) in the event of an accident or other forms of disruption?			X		YES	8a
b. Affect an existing emergency response or emergency evacuation plan or create a need for a new plan?		X				
c. Creation of any human health hazard or potential hazard?			X		YES	see 8a
d. Will any chemical toxicants be used?			X		YES	see 8a

Comment 8a: Substantial research has been conducted to determine the safety of rotenone. From this research it has been concluded that rotenone does not cause birth defects (Hazleton Raltech Laboratories 1982), reproductive dysfunction (Spencer and Sing 1982), gene mutation (Biotech Research 1981; Geothem et al. 1981; NAS 1983) or cancer (USEPA 1981b; Tisdel 1985). When used according to label instructions for the control of fish, rotenone poses little, if any hazard to public health. The USEPA (1981b, 1989b) has concluded that the use of rotenone for fish control does not present a risk of unreasonable adverse effects to humans and the environment.

The hazard associated with the short-term exposure to drinking water containing rotenone is very small because of the low concentration of rotenone (0.1 ppm) used in the treatment and the rapid breakdown and dilution of rotenone. Estimates of a single lethal dose to humans are 300-500 mg of rotenone per kilogram (2.2 pounds) of body weight (Gleason et al. 1969). For example, a 160-pound (72.6 kilogram) person would have to drink over 23,000 gallons (87,000 liters) of water treated at 0.25 mg of rotenone per liter of water at one sitting; 0.25 mg of rotenone per liter of water is the highest allowable treatment rate for fish management. A 22-pound (10 kilogram) child would have to drink over 1,429 gallons (5,400 liters). An intake of 0.7 mg of rotenone per kilogram of body weight per day is considered safe (Haley 1978), which is equivalent to about 25 mg per liter when consumed as drinking water; this concentration is far greater than the expected exposure resulting from the maximum fish management treatment rate of 0.25 mg of rotenone per liter of water or our proposed concentration of 0.1 mg per liter. Exposure of the public to rotenone in this project can be limited as the public and private landowners will be notified of treatment and detoxification timetables. Also, signing will occur at the Cottonwood Creek trailhead and periodically along the stream.

With respect to long-term exposure to rotenone, there is probably no significant risk to humans because of the low concentrations at which it is applied (100 ug/L) and the fact that it degrades so quickly. The EPA (1997) has determined that the safe level for chronic (lifetime) exposure to rotenone is 4 ug/L. If we assume that rotenone in our treatment has a half-life of 10 days, then it will take 50 days for the concentration to drop below 4 ug/L. Exposure to hazardous concentrations of rotenone for 50 days is a far shorter period of time than the EPA says is necessary to elicit chronic effects.

Fish will not be stocked into a treated area until all of the toxic effects are gone and rotenone has degraded. Stocked fish will not accumulate residues of rotenone from the water. Any fish that might survive the treatment won't pose a health threat because the bioaccumulation potential is low and the half-life of rotenone in fish is approximately 1 day (Gingerich and Rach 1985; Gingerich 1986).

USEPA has not established any guidelines for consuming fish killed with rotenone. Consumption of fish that have been dead for some time increases the risk of contracting salmonella or other bacteriological poisoning. However, fish that wash up on shore as a result of rotenone treatment are no more of a threat to public health than fish that die of natural causes.

The USEPA (1990) ruled that a reentry interval was not needed for persons who swim in waters treated with rotenone based on an assessment of the toxicology data (e.g., skin, oral water intake) and exposure level.

A commercial formulation of rotenone similar to that proposed for use in this project contains volatile organic compounds (xylene, trichlorethylene (TCE), toluene, and trimethylbenzene), and semi-volatile organic compounds (naphthalene, 1-methyl naphthalene and 2-methyl naphthalene). The organic compounds disappear before rotenone dissipates, typically within 1-3 weeks (Finlayson et al. 2000). The volatile organic compounds don't accumulate in the sediment; naphthalene and methyl naphthalene accumulate temporarily in the sediments (CDFG 1994; Siepmann and Finlayson 1999). TCE (a carcinogen) concentrations are expected to be within drinking water standard levels immediately following treatment. As a result of treatment, other materials will not exceed water quality criteria or guidelines set by the USEPA (1980a, 1981a, 1993). Many of the chemicals in liquid rotenone formulations are the same present in fuel and are present in waters because of outboard motor use. None of these constituents will be present at levels that can be expected to have any effect on animal life.

Potassium permanganate (KMnO4), used to neutralize rotenone below the fish barrier, is a strong oxidizer, non-volatile, non-flammable and stable under normal conditions (Finlayson et al. 2000). On reaction, it breaks down into potassium, manganese, and water. These are all common in nature and have no deleterious environmental effects at the concentrations normally used to neutralize rotenone. Archer (2001) reports that the amount of KMnO4 to be used depends on how rapidly the rotenone is to be neutralized. KMnO4 is toxic to fish at relatively low concentrations (2 to 10 ppm) under some circumstances and is much more toxic in alkaline waters than soft water (Archer 2001). Potassium permanganate breaks down rapidly in the natural environment thus a short plume of toxic KMnO4 immediately below the target zone can be expected. A toxic plume of rotenone may in comparison extend for many miles downstream of the target area. Archer (2001) reports that with KMnO4 concentrations properly balanced with rotenone concentrations and the water's organic demand (or chlorine demand), toxic KMnO4 levels can be reduced in a matter of minutes through the oxidation of organic components and rotenone in the water.

Hazardous exposure to potassium permanganate may occur via inhalation, ocular or dermal routes (Finlayson et al. 2000). Thus, using KMnO4 requires precautions to ensure that applicators do not come in contact with the chemical, and to avoid spontaneous combustion from contact with combustible materials. The chemical is caustic to the mucous membranes of the nose and throat and causes brown stains on the skin and clothing on contact when dissolved in water. Potassium permanganate is dusty thus the MSDS suggests that it should not be handled without protective clothing and breathing apparatus. The dry material is inert, but becomes active once dissolved in water. The chemical must be kept away from organic materials such as gasoline, oils, alcohols, or any other oxidizable material. It also reacts with many metals when dissolved.

Potassium permanganate is a caustic alkali that dissociates in water to form the permanganate ion (MnO4-) and also into Manganese dioxide (MnO2) along with the liberation of nascent (elemental) Oxygen molecules. It's primary effect then, is powerfully oxidative. As a powerful waterborne treatment with nominal residual hazard, potassium permanganate was exempted from registration with or by the EPA and has been placed on Deferred Regulatory Status for the time being by the FDA. It is thus legal for use in food fish and fisheries.

The expected conccentration of potassium permangunate that will be used to neutralize the rotenone is less than 2mg/L. The EPA believes the chronic toxicity of $KMnO_4$ breakdown products to be of no health concern based on the fact that they are naturally occuring and common in surface waters. The safety of $KMnO_4$ is further demonstrated by the fact that it is routinely added to municipal water supplies. It has been used by water treatment plants as an oxidizer since the turn of the century, and is commonly used in municipal facilities for water purification. For example, depending on the organic load in the raw water, the City of Helena treats drinking water at the rate of approximately 2.5-3.0 ppm.

9. COMMUNITY IMPACT Will the proposed action result in:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Alteration of the location, distribution, density, or growth rate of the human population of an area?		X				
b. Alteration of the social structure of a community?		X				
c. Alteration of the level or distribution of employment or community or personal income?		X				
d. Changes in industrial or commercial activity?		X				
e. Increased traffic hazards or effects on existing transportation facilities or patterns of movement of people and goods?		X				

10. PUBLIC SERVICES/TAXES/UTILITIES Will the proposed action result in:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Will the proposed action have an effect upon or result in a need for new or altered governmental services in any of the following areas: fire or police protection, schools, parks/recreational facilities, roads or other public maintenance, water supply, sewer or septic systems, solid waste disposal, health, or other governmental services? If any, specify: _____		X				
b. Will the proposed action have an effect upon the local or state tax base and revenues?		X				
c. Will the proposed action result in a need for new facilities or substantial alterations of any of the following utilities: electric power, natural gas, other fuel supply or distribution systems, or communications?		X				
d. Will the proposed action result in increased used of any energy source?		X				
e. Define projected revenue sources			X			10e
f. Define projected maintenance costs			X			10f

Comment 10e: This proposed project would be funded through Montana Fish, Wildlife and Parks. Preliminary cost estimates of the toxicant is $1-2,000.00, depending on the form used.

Comment 10f: Maintenance would include monitoring of the fishery. Site visits would occur following treatment. Initially, more frequent trips would be required to determine efficacy of treatment followed by population monitoring. Montana Fish, Wildlife and Parks would fund this work.

11. AESTHETICS/RECREATION Will the proposed action result in:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Alteration of any scenic vista or creation of an aesthetically offensive site or effect that is open to public view?		X				
b. Alteration of the aesthetic character of a community or neighborhood?		X				
c. Alteration of the quality or quantity of recreational/tourism opportunities and settings? (Attach Tourism Report)		X				
d. Will any designated or proposed wild or scenic rivers, trails or wilderness areas be impacted? (Also see 11a, 11c)		X				

12. CULTURAL/HISTORICAL RESOURCES **Will the proposed action result in:**	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Destruction or alteration of any site, structure. or object of prehistoric historic or paleontological importance?		X				
b. Physical change that would affect unique cultural values?		X				
c. Effects on existing religious or sacred uses of a site or area?		X				
d. Will the project affect historic or cultural resources?		X				

13. SUMMARY EVALUATION OF SIGNIFICANCE **Will the proposed action, considered as a whole:**	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Have impacts that are individually limited, but cumulatively considerable? (A project or program may result in impacts on two or more separate resources, which create a significant effect when considered together or in total.)		X				
b. Involve potential risks or adverse effects which are uncertain but extremely hazardous if they were to occur?		X				
c. Potentially conflict with the substantive requirements of any local, state, or federal law, regulation, standard or formal plan?		X				
d. Establish a precedent or likelihood that future actions with significant environmental impacts will be proposed?		X				
e. Generate substantial debate or controversy about the nature of the impacts that would be created?			X			13e
f. Is the project expected to have organized opposition or generate substantial public controversy? (Also see 13e)			X			See 13e
g. List any federal or state permits required.						13g

Comment 13e: We do not expect this project to generate substantial controversy. This project was formally proposed with public notification and a decision notice signed in 2001 and 2002. Following the 30-day public comment period, only one letter was received in opposition to the project. The project was not executed due to changes that occurred in Cottonwood Creek following substantial spring moisture that recharged the groundwater table and provided perennial flows. Since no contingencies were drafted in the previous Environmental Assessments for detoxification with $KMnO_4$, Concerns arose that rotenone could escape the target reach and kill fish below the Cottonwood barrier and even Holter Reservoir. Other recently proposed WCT restoration projects, Cherry Creek in the Gallatin National Forest and Staubach Creek in the Elkhorn mountains, generated substantial controversy over the use of fish toxicants, antimycin and rotenone, to remove non-native trout.

Comment 13g: The following list of permits will be required:

- DEQ 308 - Department of Environmental Quality (authorization for use of a fish toxicant)

PART III. ALTERNATIVES

Three alternatives were considered during preparation of the Environmental Assessment.

Alternative 1 - No Action.

The "No Action" alternative would leave Cottonwood Creek "as is" with a brook and rainbow trout population; both species not indigenous to Montana. This would render the construction of the upstream fish barrier constructed in 2000, useless and fail to meet the barrier's objective to establish a secure, pure population of westslope cutthroat trout in Cottonwood Creek. With this alternative, Cottonwood Creek would not be utilized to expand distribution of westslope cutthroat trout in the Upper Missouri River drainage.

Alternative 2 - Proposed Action

The proposed action involves chemical removal of the existing fish populations in Cottonwood Creek and establishment of a pure westslope cutthroat population from a nearby pure population that is at risk of extinction.

The predicted consequences of Alternative 2 include:

- Provide a limited, but unique recreational fishing experience for recreational users of the Beartooth Game Range to catch and release pure westslope cutthroat trout.
- Supply a genetic reserve for and increase the total habitat occupied by westslope cutthroat trout in the Upper Missouri River drainage.

Mitigation Measures associated with Alternative 2 are listed under the comments in the Environmental Review, and are aimed at minimizing the amount of toxicant used and reducing the risk of exposure to humans and livestock. Consequently, this alternative has been fashioned so that it minimizes degradation of state waters while being economically, environmentally, and technologically feasible. Its economic feasibility is demonstrated by the fact that it will involve less time and money to use rotenone to remove fish than it would be to use angling, netting, and electrofishing (see Alternative 3). Environmental feasibility is shown by the fact that rotenone has low persistence in the environment and the project is designed to mitigate for its use. Technological feasibility is demonstrated by the fact that rotenone applied properly can be highly effective in removal.

Alternative 3 - Mechanical Removal

This alternative is the same as the Proposed Action except that no fish toxicants would be used. Removal of fish would be by mechanical means only, including electrofishing and angling. Angling is the least effective of these methods, and it is estimated that only 20% of fish can be removed this way on an annual basis. Reproduction from year-to-year will nullify much of this effect. Angling would be particularly inefficient at removing small fish. Electrofishing can be inefficient at removing small fish and is generally considered to be about 75% effective even after repeatedly working an area for 5-7 years. Part of the problem is that fish will sense the electricity and hide under rocks or in woody debris and avoid capture. This problem gets progressively worse as the width and depth of the stream increases. In order to insure that the cutthroat genetics are maintained pure, the potential for genetic contamination of rainbow trout genes must be eliminated. This alternative doe not maximize the security of the westslope cutthroat trout and is considered to be economically and technologically infeasible because of the uncertainties associated with a successful outcome and the number of years that would be required before success could be guaranteed. These time delays would inflate the cost and slow the process of increasing westslope cutthroat trout security.

PART IV. ENVIRONMENTAL ASSESSMENT CONCLUSION SECTION

A) Is an EIS required? No

This environmental review demonstrates that the impacts of this proposed project are not significant. The proposed action would benefit westslope cutthroat trout in the Upper Missouri River drainage with minimal impact on the physical, biological, or the human environment. Fishing opportunities for Montana anglers would be slightly reduced over the short term until a fishery was re-established.

B) Public Involvement.

This EA will be posted on the State Bulletin Board and mailed directly to potentially interested persons. Public notification of the proposed action was completed via Region 4's standard press release package to Montana newspapers and other media outlets. We also published a Legal Notice in the Great Falls Tribune and Helena Independent Record. Notices about the availability of the EA were mailed to individuals who have expressed an interest in the area or in fish management of the Region 4 waters. Any interested citizen will be encouraged to contact FWP to discuss the proposal.

C) Duration of the comment period?

The comment period is 45 days. Public comment will be accepted through _____, 2003

D) Name, title, address, and telephone number of the Person Responsible for Preparing the EA Document.

Steve Dalbey
Fisheries Biologist
Montana Fish, Wildlife and Parks
930 W Custer
Helena, MT 59620
(406) 449-8864.ext. 156

References

(AVAILABLE UPON REQUEST)